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For: Air Flow Sensor

- 1           1.     An air flow sensor comprising:
  - 2                   a temperature dependent resistor device;
  - 3                   a first circuit for applying a voltage to the temperature dependent resistor
  - 4     device until it reaches a first temperature, the first circuit including:
    - 5                   a first reference resistance leg,
    - 6                   a first variable resistance leg including the temperature dependent
    - 7                   resistor device, and
    - 8                   a first comparator connected to both legs for determining when the
    - 9                   temperature dependent resistor-device reaches the first temperature;
    - 10                  a second circuit including:
      - 11                   a second reference resistance leg,
      - 12                   a second variable resistance leg including the temperature dependent
      - 13                   resistor device, and
      - 14                   a second comparator connected to both legs for determining when
      - 15                   the temperature dependent resistor device reaches a second
      - 16                   temperature; and
      - 17                  a processor connected to both the first and second comparators and
      - 18     programmed to time the period of time it takes the temperature dependent resistor device to
      - 19     change from the first temperature to the second temperature to determine the heat loss rate
      - 20     of the temperature dependent resistor device.

1           2.       The air flow sensor of claim 1 in which the temperature dependent resistor  
2 device is a thermistor.

1           3.       The air flow sensor of claim 1 in which the first variable resistance leg  
2 includes a low impedance resistor connected in series with the temperature dependent  
3 resistor device and the first reference resistance leg includes a plurality of resistors  
4 connected in series, the first reference resistance leg connected in parallel with the first  
5 variable resistance leg.

1           4.       The air flow sensor of claim 1 in which the second reference resistance leg  
2 includes a plurality of resistors connected in series and the second variable resistance leg  
3 includes a high impedance resistor connected in series with the temperature dependent  
4 resistor device, the second reference resistance leg connected in parallel with the second  
5 variable resistance leg.

1           5.       The air flow sensor of claim 1 further including a first switch connected  
2 between a voltage source and the first circuit, the processor programmed to close the first  
3 switch until the temperature dependent resistor device reaches the first temperature and to  
4 then open the first switch.

1           6.       The air flow sensor of claim 1 further including a second switch connected  
2       between a voltage source and the second circuit, the processor further programmed to  
3       close the second switch after the temperature dependent resistor device reaches the first  
4       temperature.

1           7.       The air flow sensor of claim 1 further including an ambient temperature  
2       sensing circuit including the temperature dependent resistor device.

1           8.       The air flow sensor of claim 7 in which the ambient temperature sensing  
2       circuit includes a reference resistor and a capacitor connected in series with the  
3       temperature dependent resistor device.

1           9.       The air flow sensor of claim 8 in which the processor is connected on a  
2       first line between the reference resistor and the capacitor and on a second line between  
3       the capacitor and the temperature dependent resistor device.

1           10.      The air flow sensor of claim 9 in which the processor is programmed to  
2       apply a voltage on the first line and to detect the voltage on the second line until it  
3       reaches a predetermined level and to then apply a voltage on the second line and to detect  
4       the voltage on the first line until it reaches the predetermined level.

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1 11. An air flow sensor comprising:  
2 a temperature dependent resistor device;  
3 means for applying a voltage to the temperature dependent resistor device  
4 until it reaches a first temperature;  
5 means for determining when the temperature dependent resistor device then  
6 cools to a second, temperature; and  
7 means for timing the period of time it takes the temperature dependent  
8 device to change from the first temperature to the second temperature to determine the heat  
9 loss rate of the temperature dependent resistor device.

1 12. The air flow sensor of claim 11 in which the means for applying a voltage  
2 includes a first switch connected between a voltage source and a first circuit which  
3 includes a comparator connected to a first reference resistance leg and a first variable  
4 resistance leg including the temperature dependent resistor device, the comparator  
5 providing an output signal when the resistance of the temperature dependent resistor  
6 device causes the first circuit to balance.

1           13.    The air flow sensor of claim 11 in which the means for determining  
2 includes a second switch connected between a voltage source and a second circuit which  
3 includes a comparator connected to a second reference resistance leg and a second  
4 variable resistance leg including the temperature dependent resistor device, the  
5 comparator providing an output signal when the resistance of the temperature dependent  
6 resistor device causes the second circuit to balance.

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1 14. A method of determining the heat transfer rate of a temperature dependent  
2 resistor device, the method comprising:  
3 heating the temperature dependent resistor device to a first temperature;  
4 allowing the temperature dependent resistor device to cool to a second  
5 temperature;  
6 measuring the period of time it takes for the temperature dependent resistor  
7 device to cool to the second temperature; and  
8 calculating the rate of heat transfer of the temperature dependent resistor  
9 device based on the measured period of time.

1 15. The method of claim 14 in which the step of heating includes applying a  
2 first voltage across the temperature dependent resistor device until it reaches a first  
3 resistance value.

1 16. The method of claim 15 in which the step of allowing the temperature  
2 dependent resistor device to cool includes applying a second, lower voltage across the  
3 temperature dependent resistor device until it reaches a second resistance value.

1 17. The method of claim 14 in which the step of measuring includes  
2 monitoring when the temperature dependent resistor device reaches the first resistance  
3 value and timing the time period it takes to reach the second resistance value.